LISTING OF CLAIMS

CLAIMS

What is claimed, is:

(1) (Currently amended) A sound source localization system comprising:

sound processing means ;

for reflecting a sound wave generated from a sound source according to a sound source position;

for recording acoustic data collected with direct sound;

for converting said acoustic data into digital data for later processing and holding said acoustic data in a recording unit, and forming a new cue, said new sound cue being delay information generated by a physical sound reflecting element; and

for employing said delay information in addition to a conventional cue, not depending upon any particular kind of signal sound source,

said processing means comprising:

~~a~~ the sound reflecting element for generating said delay information corresponding to a relative position between said ~~a~~ sound source and a physical sound collecting means, said sound reflecting element having a sound reflecting surface, sound reflecting from said sound reflecting element to reflect a sound wave generated from the sound source inherently corresponding to ~~a~~ the sound source position ~~and to enable recording and processing of acoustic data~~;

a storage part for recording and storing the acoustic data ~~employing sound~~ and said delay information generated by said sound reflecting element, and superimposing said delay information on the acoustic data, and

a sound source localization part for acquiring a sound source position, employing the acoustic data on which said delay information is superposed.

(2) (Currently amended) The sound source localization system according to claim 1, wherein said sound reflecting element is formed as a spheroid associated with the relative position between the sound source and sound collecting means to generate said delay information intrinsic to said relative position, wherein a reflecting surface of the sound reflecting element is designed as an envelope made from a plurality of virtual spheroids formed by rotating a plurality of ellipses having two focal points corresponding to the sound source and the sound collecting mean around an axis connecting the focal points, said plurality of ellipses being generated in relation with an elevation between the sound source and the sound collecting means and being flatter as the elevation is greater, said reflecting surface being an enveloping surface of the plurality of virtual spheroids generated by rotating a corresponding ellipse around the axis connecting the focal points.

(3) (previously presented) The sound source localization system according to claim 1, wherein said sound source localization part comprises a standard template storage part for storing a standard template containing intrinsic delay information generated by a white noise sound source, a background noise template storage part for storing a background noise template, a residual generation part for calculating a residual from said acoustic data, employing said standard template and said background noise template, and a selection part for selecting the standard template giving the least residual, employing the generated residual.

(4) (original) The sound source localization system according to claim 3, wherein said standard template storage part stores the standard template and the sound source position giving said standard template in association.

(5) (original) The sound source localization system according to claim 1, wherein said sound source localization system comprises at least one sound reflecting element, and simultaneously

acquires positional data of the sound source including a range to the sound source, an azimuth and an elevation as said relative position.

(6) (Currently amended) A sound source localization method comprising acquiring ~~the~~ a position of a sound source under the control of an information processing apparatus by:

reflecting a sound wave generated from the sound source according to a sound source position;

recording acoustic data collected with direct sound;

converting said acoustic data into digital data for later processing and holding said acoustic data in a recording unit;

forming a new cue generated by a physical sound reflecting element, said new sound cue being delay information; and

for employing said delay information in addition to a conventional cue, not depending upon any particular kind of signal sound source, wherein, said step of acquiring comprising:

a step of collecting acoustic data with delay information superposed corresponding to a relative position between ~~a~~ the sound source and sound collecting means, employing sound delay information generated by ~~a~~ the sound reflecting element wherein a reflecting surface of the sound reflecting element is designed as an envelope made from a plurality of virtual spheroids formed by rotating a plurality of ellipses having two focal points corresponding to the sound source and the sound collecting mean respectively, around an axis connecting the focal points, after superimposing said delay information on the acoustic data;

a step of storing said collected acoustic data in a storage part; and

a step of reading the acoustic data with said delay information superposed and acquiring said relative position of said sound source designated by said delay information.

(7) (Previously presented) The sound source localization method according to claim 6, wherein said delay information is generated by reflection from a spheroid associated with said relative position between the sound source and sound collecting means, and said delay information is generated intrinsic to said relative position, and further comprising using the sound source position at an angle in a system with a small number of microphones.

(8) (previously presented) The sound source localization method according to claim 6, wherein said sound source localization step comprises a step of reading out a standard template from a standard template storage part for storing the standard template containing delay information intrinsic to said relative position generated by a white noise sound source, a step of reading out a background noise template from a background noise template storage part for storing the background noise template, a step of calculating a residual from said acoustic data, employing said standard template and said background noise template, and a step of selecting the standard template giving the least residual, employing the generated residual.

(9) (original) The sound source localization method according to claim 6, wherein said selection step comprises a step of referring to the selected standard template and acquiring the sound source position corresponding to said standard template.

(10) (original) The sound source localization method according to claim 6, further comprising a step of simultaneously acquiring the range, azimuth and elevation as said relative position from said acquired sound source position to said sound source.

(11) (withdrawn) A sound reflecting element for generating delay information corresponding to a relative position between a sound source and sound collecting means, wherein a reflecting surface of said sound reflecting element has an envelope made from a plurality of spheroids that

are formed by rotating a plurality of ellipses having the distance between the focal points corresponding to the distance from said sound source to said sound collecting means around an axis connecting said focal points.

(12) (withdrawn) The sound reflecting element according to claim 11, wherein said plurality of ellipses are generated in relation with the elevation between said sound source and said sound collecting means and flatter as said elevation is greater.

(13) (withdrawn) The sound reflecting element according to claim 11, wherein said reflecting surface is formed as an enveloping surface of said plurality of spheroids that are generated by rotating a corresponding ellipse around the axis connecting said focal points.

(14) (withdrawn) A formation method of a sound reflecting element comprising:

generating delay information corresponding to a relative position between a sound source and sound collecting means;

a step of generating a plurality of spheroids by rotating an ellipse having the distance between the focal points corresponding to the distance from said sound source to said sound collecting means around an axis connecting said focal points; and

a step of forming a reflecting surface by generating an enveloping surface of said plurality of spheroids.

(15) (withdrawn) The formation method of the sound reflecting element according to claim 14, wherein said plurality of ellipses are generated in relation with the elevation between said sound source and said sound collecting means and flatter as said elevation is greater.

(16) (previously presented) The sound source localization system according to claim 1, wherein said sound reflecting element is an element for generating the delay information corresponding

to a relative position between a sound source and sound collecting means, wherein a reflecting surface of said sound reflecting element has an envelope made from a plurality of spheroids that are formed by rotating a plurality of ellipses having the distance between the focal points corresponding to the distance from said sound source to said sound collecting means around an axis connecting said focal points.

(17) (previously presented) The sound source localization system according to claim 16, wherein said plurality of ellipses are generated in relation with the elevation between said sound source and said sound collecting means and flatter as said elevation is greater.

(18) (previously presented) The sound source localization system according to claim 16, wherein said reflecting surface is formed as an enveloping surface of said plurality of spheroids that are generated by rotating a corresponding ellipse around the axis connecting said focal points.

(19) (previously presented) The sound source localization system according to claim 1, wherein said sound reflecting element is an element generated by a formation method comprising:

generating delay information corresponding to a relative position between a sound source and sound collecting means;

a step of generating a plurality of spheroids by rotating an ellipse having the distance between the focal points corresponding to the distance from said sound source to said sound collecting means around an axis connecting said focal points; and

a step of forming a reflecting surface by generating an enveloping surface of said plurality of spheroids.

(20) (previously presented) The sound source localization system according to claim 19, wherein said plurality of ellipses are generated in relation with the elevation between said sound source and said sound collecting means and flatter as said elevation is greater.

(21) (Previously presented) The sound source localization method according to claim 6, wherein the plurality of ellipses is generated in relation with an elevation between the sound source and the sound collecting means and is flatter as the elevation is greater.

(22) (Previously presented) The sound source localization method according to claim 6, wherein the reflecting surface is designed as an enveloping surface of the plurality of spheroids generated by rotating a corresponding ellipse around the axis connecting the focal points.

(23) (Previously presented) The sound source localization system according to claim 1, wherein a path difference between the sound wave directly collected from the sound source and a reflected wave reflected from the reflecting surface of the sound reflecting element, and a shape of the sound reflecting element is configured to relate the position of sound source with the path difference.

(24) (Previously presented) The sound source localization system according to claim 1, wherein the sound reflecting element is configured as a set of elliptic curves, and further comprising using the sound source position at an angle in a system with a small number of microphones.

(25) (Currently amended) The sound source localization system according to claim 24 ~~claim 25~~, wherein a cross section of the reflecting surface is configured using an ellipse in which the sound source is disposed at a first focal point and the microphone is disposed at a second focal point the ellipse.

(26) (Currently amended) The sound source localization system according to claim 25 ~~claim 26~~, wherein a sound wave starting from the first focal point is collected at the second focal point, even when reflected at any other position.

(27) (Previously presented) The sound source localization system according to claim 1, further comprising means for employing a path difference for the localization of the sound source; and

moving a microphone relative to the sound reflecting element and the sound source, as the sound source is moved.

(28) (Currently amended) A position location method comprising enabling estimation of a sound source position at an angle in a system with a small number of microphones, the step of enabling comprising:

forming a reflecting surface as an enveloping surface designed as an envelope made from at least one virtual spheroid formed by rotating at least one ~~of~~ ellipse having two focal points, one focal point of each said at least one ellipse corresponding to the sound source and a second focal point of each said at least one ellipse corresponding to the sound collecting means ~~mean respectively~~,

in which a position of said sound collecting means and ~~a~~ the sound source position are the focal points of each said at least one said ellipse;

generating a delay amount corresponding to a sound source position of a reflected wave of a direct wave;

measuring the delay amount between the direct wave and the reflected wave; and

acquiring the sound source position from the result of the step of measuring.